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Application Number	10/660,048
Filing Date	09/11/03
First Named Inventor	Lazerotti et al.
Art Unit	2826
Examiner Name	T. Quach
Attorney Docket Number	BUR920010146US2

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- **§ 1.182** - for decision on a question not specifically provided for.
- **§ 1.183** - to suspend the rules.
- **§ 1.378(e)** - for reconsideration of decision on petition refusing to accept delayed payment of maintenance fee in an expired patent.
- **§ 1.741(b)** - to accord a filing date to an application under § 1.740 for extension of a patent term.

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- **§ 1.59** - for expungement of information.
- **§ 1.103(a)** - to suspend action in an application.
- **§ 1.136(b)** - for review of a request for extension of time when the provisions of section 1.136(a) are not available.
- **§ 1.295** - for review of refusal to publish a statutory invention registration.
- **§ 1.296** - to withdraw a request for publication of a statutory invention registration filed on or after the date the notice of intent to publish issued.
- **§ 1.377** - for review of decision refusing to accept and record payment of a maintenance fee filed prior to expiration of a patent.
- **§ 1.550(c)** - for patent owner requests for extension of time in *ex parte* reexamination proceedings.
- **§ 1.956** - for patent owner requests for extension of time in *inter partes* reexamination proceedings.
- **§ 5.12** - for expedited handling of a foreign filing license.
- **§ 5.15** - for changing the scope of a license.
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- **§ 1.102(d)** - to make an application special.
- **§ 1.138(c)** - to expressly abandon an application to avoid publication.
- **§ 1.313** - to withdraw an application from issue.
- **§ 1.314** - to defer issuance of a patent.

[signature]	02/17/06
Signature	Date
Pamela M. Riley	40,146
Typed or printed name	Registration No., if applicable

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10/660,048

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

Lanzerotti et al.

Serial No. 10/660,048 Group Art Unit: 2826

Filed: September 11, 2003 Examiner: Quach, Tuan N.

For: SILICON GERMANIUM HETEROJUNCTION BIPOLAR TRANSISTOR WITH CARBON INCORPORATION

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Commissioner for Patents
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Alexandria, VA 22313-1450

PETITION TO RECONSIDER AND REVERSE
THE WITHDRAWAL OF CLAIMS FROM CONSIDERATION

Sir:

Applicants hereby petition the Director to reconsider and reverse the withdrawal of claims 32-43 from consideration in the above-referenced patent application as claims 32-43 are directed to the same species as the elected species claimed in claims 9-13

On August 24, 2005 claims 9-13 and 20-31 were subjected to an election of species requirement. The Examiner indicated that the species of claims 20-31 were directed to a bipolar transistor, as opposed to the semiconductor of claims 9-13 and Figure 9A, and further indicated that the election requirement was consistent with a restriction requirement in the parent application between claims 1-8 (a bipolar transistor) and claims 9-13 (a semiconductor).

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Pamela M. Riley

On September 7, 2005 in response to this election of species requirement, the Applicants elected the species of Figure 9A and identified claims 9-13, regarding the semiconductor, as reading on Figure 9A. The Applicants further canceled claims 20-31 directed to the non-elected species and added new claims 32-43 directed to the elected species (See Attachment A for a listing of the claims as filed on September 7, 2005). The Office Action dated November 17, 2005 subsequently applied that election to support the withdrawal from consideration of claims 32-43. However, the Applicants respectfully disagree and submit that new claims 32-43 are specifically directed to the same species as original claim 9-13 "a semiconductor" and not the "bipolar transistor" of non-elected claims 20-31.

Particularly, claims 9-13 and claims 32-43 all claim "A semiconductor for use in a bipolar transistor." Contrarily, cancelled claims 20-31 were directed specifically to "A bipolar transistor" one feature of which being the claimed "a semiconductor layer" and other features, being an emitter, base, collector, etc. that are all inherent in a bipolar transistor. The features of Claims 32-43 do not claim the structural elements of a bipolar transistor such as an emitter, base, collector, etc.,but rather refer just to the elected semiconductor. Specifically, the elected Figure 9A illustrates the steps of adding carbon to a semiconductor film and doping a diffusion region within the semiconductor film. Independent claim 9 claims a semiconductor for use in a bipolar transistor that comprises carbon atoms and a doped region. Whereas, independent claims 32 and 38 further define features of the semiconductor as comprising "a single crystalline region" and "a polycrystalline region adjacent said single crystalline region" within which the carbon atoms and doped region of Figure 9A are located. The carbon atoms of claim 9 are within both the single crystalline region and the polycrystalline region and the doped region is in the single crystalline region adjacent to the polycrystalline region. Therefore, as explained in greater detail below, new claims 32-43 are clearly directed to the same species as claims 9-13, and should not have been withdrawn from consideration. Thus, Applicants respectfully petition for their return to the application and to examination.

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More particularly, a September 10, 2002 Office Action issued a restriction requirement in the parent application of the present invention (09/683498). That Office Action indicated that claims 1-8 for "a bipolar transistor" were drawn to a device classified as an active solid-state device (class 257) and particularly, a "heterojunction device" (Subclass 183). That Office Action further found that claims 9-13 for "a semiconductor for use in a bipolar transistor" were drawn to a device classified as an active solid-state device (class 257) and particularly, a "thin active physical layer..."(Subclass 9). On August 24, 2005 claims 9-13 and 20-31 were subjected to an election of species requirement. The Examiner indicated that the species of claims 20-31 were directed to a bipolar transistor (as in original claims 1-8), as opposed to a semiconductor (as in original claims 9-13, Figure 9A) and, specifically, indicated that the election requirement was consistent with the September 10, 2002 restriction requirement in the parent application.

On September 7, 2005, in response to that election of species requirement, claims 20-31 were canceled and new claims 32-43 were submitted. However, the November 17, 2005 Office Action withdrew new claims 32-43 from consideration. In support of the withdrawal, the Office Action indicated that the new claims 32-43 were not directed to the elected species, regarding the semiconductor, but rather to the bipolar transistor of the non-elected species 20-31. The Office Action further stated that the "Applicant argues that the preamble of semiconductor for use in bipolar transistor making these claims correspond to species 1 is unpersuasive in view of the recitation of corresponding structure regions delineated above and in view of recited improved characteristics delineated above regarding the bipolar." The structures delineated included "the single crystalline region and the polycrystalline region, improved electrostatic discharge protection of the bipolar transistor, increased speed and control breakdown voltage," which would correspond to and be grouped together with the non-elected species.

The Applicants respectfully disagree and in support of this petition submit that claims 9-13 and claims 32-43 are drawn to the same species in that they define the same essential characteristics of a *single* disclosed embodiment of an invention, and simply vary in breadth and scope. While claims 32-43 contain similar structural features as claims 20-31, those features were specifically directed to the same species as original claim 9-13 "A semiconductor for use in a bipolar transistor." All structural elements of a bipolar transistor such as the emitter, base, collector, etc. were specifically removed from claims 32-43 to leave just the elected

semiconductor. As mentioned above, Figure 9A refers to method steps of adding carbon to a semiconductor film and doping a diffusion region within the semiconductor film. Independent claim 9 claims a semiconductor for use in a bipolar transistor that comprises carbon atoms and a doped region. Whereas, independent claims 32 and 38 further define features of the semiconductor as comprising "a single crystalline region" and "a polycrystalline region adjacent said single crystalline region" within which the carbon atoms and doped region of Figure 9A are located. The carbon atoms of claim 9 are within both the single crystalline region and the polycrystalline region and the doped region is in the single crystalline region adjacent to the polycrystalline region. Thus, the features of a single crystalline region and polycrystalline region describe the semiconductor layer of the elected species, thereby, limiting the scope of the elected species (a semiconductor for use in a bipolar transistor) and not describing the non-elected species (i.e., a bipolar transistor). Additionally, while independent claims 32 and 38 each mentioned benefits that the structure of the semiconductor layer of the invention provides when it is used by a bipolar transistor and several of the dependent claims describe the relationship between the semiconductor layer and the bipolar transistor with which it is used, the bipolar transistor itself was not claimed in claims 32-43.

Consequently, the Applicants submit that claims 32-43, as submitted on September 7, 2005 (See Attachment A), should have been considered the same species as claims 9-13 and should not have been withdrawn from consideration. Additionally, claims 32-43 were amended in an Amendment filed under 37 C.F.R. §1.116 on January 5, 2006, in response to the comments in the November 17, 2005 Office Action, to remove references to any benefits provided by the semiconductor layer to a bipolar transistor or any relationship to specific structures within a bipolar transistor in order to further clarify that these claims are drawn to the same species as claims 9-13 (See Attachment B for a listing of the claims as filed on January 5, 2006). By an Advisory Action dated February 9, 2006, the Applicants were informed that the withdrawal from consideration of claims 32-43 was not reversed and that the proposed amendments were not entered. Consequently, in conjunction with this petition, the Applicants are simultaneously filing a Request for Continued Examination (RCE) of the pending claims asking that the un-entered claims, that were submitted with the January 5, 2006 Amendment, be entered and examined.

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In view of the foregoing, the Examiner is respectfully requested to reconsider and reverse the decision to withdrawal from consideration claims 32-43.

Please charge the Petition fee Under §1.182 of $400.00 and any other fees required to Attorney's Deposit Account No. 09-0456.

In view of the above error being on the part of the Patent Office, Applicant hereby requests that this Petition fee of $400.00 be refunded to Attorney's Deposit Account No. 09-0456.

Dated: 2/17/06

Respectfully submitted,

Pamela M. Riley
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ATTACHMENT A

(Claims Filed September 7, 2005 in U.S. Patent Application No. 10/660,048)

1-8. (Canceled).

9. A semiconductor for use in a bipolar transistor, said semiconductor comprising:

carbon atoms; and

a doped region that comprises less than all of said semiconductor and comprises a dopant interacting with said carbon atoms,

wherein said carbon atoms limit outdiffusion of said dopant to physically limit a size of said doped region within said semiconductor, and wherein said dopant is included in sufficient quantities to reduce a resistance of said semiconductor to less than approximately 4 Kohms/cm^2.

10. The semiconductor in claim 9, wherein said dopant is included in a peak concentration of approximately 1×10^{20} per cm^3 to 1×10^{21} per cm^3.

11. The semiconductor in claim 9, wherein said dopant comprises one of boron, aluminum, gallium, indium, and titanium.

12. The semiconductor in claim 9, further comprising silicon germanium.

13. The semiconductor in claim 9, wherein said carbon atoms maintain said dopant within a central portion of said semiconductor.

14-19. (Canceled).

20-31. (Canceled).

32. A semiconductor for use in a bipolar transistor, said semiconductor comprising:

a single crystalline region;

a polycrystalline region adjacent said single crystalline region;

carbon atoms within said single crystalline region and said polycrystalline region; and

a doped region in said single crystalline region adjacent said polycrystalline region,

wherein said doped region comprises a dopant interacting with said carbon atoms,

wherein said carbon atoms limit outdiffusion of said dopant such that a size of said doped region is physically limited within said semiconductor, and

wherein said dopant is included in sufficient quantities to reduce a resistance of said semiconductor and provide improved electrostatic discharge protection of said bipolar transistor.

33. The semiconductor in claim 32, wherein said dopant is included in a peak concentration of approximately 1×10^{20} per cm^3 to 1×10^{21} per cm^3.

34. The semiconductor in claim 32, wherein said doped region is aligned with another doped region in a collector of said bipolar transistor.

35. The semiconductor in claim 32, wherein said polycrystalline region is positioned adjacent a shallow trench isolation structure in a collector of said bipolar transistor.

36. The semiconductor in claim 32, wherein said carbon atoms maintain said dopant within a central portion of said semiconductor between an emitter contact and a base contact of said bipolar transistor.

37. The semiconductor in claim 32, wherein said carbon atoms reduce strain within said semiconductor.

38. A semiconductor for use in a bipolar transistor, said semiconductor comprising:

a single crystalline region;

a polycrystalline region adjacent said single crystalline region;

a doped region in said single crystalline region adjacent said polycrystalline region; and,

carbon atoms within said single crystalline region and said ploycrystalline region;

wherein said carbon atoms limit outdiffusion of said dopant such that a size of said doped region within said semiconductor is physically limited to increase speed and control breakdown voltage of said bipolar transistor.

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39. The semiconductor of claim 38, wherein said dopant is included in a peak concentration of approximately 1×10^{20} per cm^3 to 1×10^{21} per cm^3.

40. The semiconductor of claim 38, wherein said doped region is aligned with another doped region in a collector of said bipolar transistor.

41. The semiconductor in claim 38, wherein said polycrystalline region is positioned adjacent a shallow trench isolation structure in a collector of said bipolar transistor.

42. The semiconductor in claim 38, wherein said carbon atoms maintain said dopant within a central portion of said semiconductor between an emitter contact and a base contact of said bipolar transistor.

43. The semiconductor in claim 38, wherein said carbon atoms reduce strain within said semiconductor layer.

ATTACHMENT B
(Claims Filed January 5, 2006 in U.S. Patent Application No. 10/660,048)

1-8. (Canceled).

9. A semiconductor layer for use in a bipolar transistor, said semiconductor layer comprising:

carbon atoms; and

a doped region that comprises less than all of said semiconductor layer and comprises a dopant interacting with said carbon atoms,

wherein said carbon atoms limit outdiffusion of said dopant to physically limit a size of said doped region within said semiconductor layer, and wherein said dopant is included in sufficient quantities to reduce a resistance of said semiconductor layer to less than approximately 4 Kohms/cm^2.

10. The semiconductor layer in claim 9, wherein said dopant is included in a peak concentration of approximately 1×10^{20} per cm^3 to 1×10^{21} per cm^3.

11. The semiconductor layer in claim 9, wherein said dopant comprises one of boron, aluminum, gallium, indium, and titanium.

12. The semiconductor layer in claim 9, further comprising silicon germanium.

13. The semiconductor layer in claim 9, wherein said carbon atoms maintain said dopant within a central portion of said semiconductor layer.

14-31. (Canceled).

32. A semiconductor layer for use in a bipolar transistor, said semiconductor layer comprising:

a single crystalline region;

a polycrystalline region adjacent said single crystalline region;

carbon atoms within said single crystalline region and said polycrystalline region; and

a doped region in said single crystalline region adjacent said polycrystalline region,

wherein said doped region comprises a dopant interacting with said carbon atoms,

wherein said carbon atoms limit outdiffusion of said dopant such that a size of said doped region is physically limited within said semiconductor layer, and

wherein said dopant is included in sufficient quantities to reduce a resistance of said semiconductor layer.

33. The semiconductor layer in claim 32, wherein said dopant is included in a peak concentration of approximately 1×10^{20} per cm^3 to 1×10^{21} per cm^3.

34. The semiconductor layer in claim 32, wherein said doped region is aligned with another doped region in a second semiconductor layer.

35. The semiconductor layer in claim 32, wherein said polycrystalline region is positioned adjacent a shallow trench isolation structure in second semiconductor layer.

36. The semiconductor layer in claim 32, wherein said carbon atoms maintain said dopant within a central portion of said semiconductor layer between two contacts.

37. The semiconductor layer in claim 32, wherein said carbon atoms reduce strain within said semiconductor layer.

38. A semiconductor layer for use in a bipolar transistor, said semiconductor comprising:

a single crystalline region;

a polycrystalline region adjacent said single crystalline region;

a doped region in said single crystalline region adjacent said polycrystalline region; and,

carbon atoms within said single crystalline region and said ploycrystalline region;

wherein said carbon atoms limit outdiffusion of said dopant such that a size of said doped region within said semiconductor layer is physically limited to breakdown voltage.

39. The semiconductor layer of claim 38, wherein said dopant is included in a peak concentration of approximately 1×10^{20} per cm^3 to 1×10^{21} per cm^3.

40. The semiconductor layer of claim 38, wherein said doped region is aligned with another doped region in a second semiconductor layer.

41. The semiconductor in claim 38, wherein said polycrystalline region is positioned adjacent a shallow trench isolation structure in a second semiconductor layer.

42. The semiconductor layer of claim 38, wherein said carbon atoms maintain said dopant within a central portion of said semiconductor layer between two contacts.

43. The semiconductor layer in claim 38, wherein said carbon atoms reduce strain within said semiconductor layer.

ATTACHMENT B

(Claims Filed January 5, 2006 in U.S. Patent Application No. 10/660,048)

1-8. (Canceled).

9. A semiconductor layer for use in a bipolar transistor, said semiconductor layer comprising:

carbon atoms; and

a doped region that comprises less than all of said semiconductor layer and comprises a dopant interacting with said carbon atoms,

wherein said carbon atoms limit outdiffusion of said dopant to physically limit a size of said doped region within said semiconductor layer, and wherein said dopant is included in sufficient quantities to reduce a resistance of said semiconductor layer to less than approximately 4 Kohms/cm^2.

10. The semiconductor layer in claim 9, wherein said dopant is included in a peak concentration of approximately 1×10^{20} per cm^3 to 1×10^{21} per cm^3.

11. The semiconductor layer in claim 9, wherein said dopant comprises one of boron, aluminum, gallium, indium, and titanium.

12. The semiconductor layer in claim 9, further comprising silicon germanium.

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13. The semiconductor layer in claim 9, wherein said carbon atoms maintain said dopant within a central portion of said semiconductor layer.

14-31. (Canceled).

32. A semiconductor layer for use in a bipolar transistor, said semiconductor layer comprising:

a single crystalline region;

a polycrystalline region adjacent said single crystalline region;

carbon atoms within said single crystalline region and said polycrystalline region; and

a doped region in said single crystalline region adjacent said polycrystalline region,

wherein said doped region comprises a dopant interacting with said carbon atoms,

wherein said carbon atoms limit outdiffusion of said dopant such that a size of said doped region is physically limited within said semiconductor layer, and

wherein said dopant is included in sufficient quantities to reduce a resistance of said semiconductor layer.

33. The semiconductor layer in claim 32, wherein said dopant is included in a peak concentration of approximately 1×10^{20} per cm^3 to 1×10^{21} per cm^3.

34. The semiconductor layer in claim 32, wherein said doped region is aligned with another doped region in a second semiconductor layer.

35. The semiconductor layer in claim 32, wherein said polycrystalline region is positioned adjacent a shallow trench isolation structure in second semiconductor layer.

36. The semiconductor layer in claim 32, wherein said carbon atoms maintain said dopant within a central portion of said semiconductor layer between two contacts.

37. The semiconductor layer in claim 32, wherein said carbon atoms reduce strain within said semiconductor layer.

38. A semiconductor layer for use in a bipolar transistor, said semiconductor comprising:

a single crystalline region;

a polycrystalline region adjacent said single crystalline region;

a doped region in said single crystalline region adjacent said polycrystalline region; and,

carbon atoms within said single crystalline region and said ploycrystalline region;

wherein said carbon atoms limit outdiffusion of said dopant such that a size of said doped region within said semiconductor layer is physically limited to breakdown voltage.

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39. The semiconductor layer of claim 38, wherein said dopant is included in a peak concentration of approximately 1 x 10^{20} per cm^3 to 1 x 10^{21} per cm^3.

40. The semiconductor layer of claim 38, wherein said doped region is aligned with another doped region in a second semiconductor layer.

41. The semiconductor in claim 38, wherein said polycrystalline region is positioned adjacent a shallow trench isolation structure in a second semiconductor layer.

42. The semiconductor layer of claim 38, wherein said carbon atoms maintain said dopant within a central portion of said semiconductor layer between two contacts.

43. The semiconductor layer in claim 38, wherein said carbon atoms reduce strain within said semiconductor layer.